STAT/MA 41600
In-Class Problem Set #10: September 16, 2015
Solutions by Mark Daniel Ward

Problem Set 10 Answers

1a. As we saw on Monday, we have $p_X(1) = 1/4$ and so $p_X(0) = 3/4$. Thus, we have $\mathbb{E}(X) = (1)(1/4) + (0)(3/4) = 1/4$.
1b. As we saw on Friday, September 11, we have $p_X(0) = 0.064$, $p_X(1) = 0.288$, $p_X(2) = 0.432$, $p_X(3) = 0.216$, so we get $\mathbb{E}(X) = (0)(0.064)+(1)(0.288)+(2)(0.432)+(3)(0.216) = 1.8$.

2a. We compute the following: $p_Y(0) = \binom{2}{0}\binom{6}{2}/\binom{8}{2} = 15/28$, $p_Y(1) = \binom{2}{1}\binom{6}{1}/\binom{8}{2} = 3/7$, and $p_Y(2) = \binom{2}{2}\binom{6}{0}/\binom{8}{2} = 1/28$.
2b. We have $\mathbb{E}(Y) = (0)(15/28) + (1)(3/7) + (2)(1/28) = 1/2$.
2c. Yes, the probability mass functions of X and Y are the same, so their expected values are the same too.

3a. We compute: $p_X(0) = (4/6)(3/6) = 1/3$, $p_X(1) = (2/6)(3/6) + (4/6)(3/6) = 1/2$, $p_X(2) = (2/6)(3/6) = 1/6$.
3b. The expected value of X is: $\mathbb{E}(X) = (0)(1/3) + (1)(1/2) + (2)(1/6) = 5/6$.

4a. As we computed in Problem Set #2, question 1b, we get $p_X(0) = 1/21$, $p_X(1) = 5/14$, $p_X(2) = 10/21$, $p_X(3) = 5/42$.
4b. We have $\mathbb{E}(X) = (0)(1/21) + (1)(5/14) + (2)(10/21) + (3)(5/42) = 5/3$.